1. Modified Euler Method(Runge-Kutta Method)

In[207]:=

```
x0 = 1;
y0 = 1;
xn = 6;
n = 5;

h = (xn - x0) / n;

f[t_, x_] := 1 + x / t;
exact[t_] := t * (1 + Log[t]);

output = {};

ti = x0;
wi = y0;

For[i = 0, i ≤ n, i++,

 actual = exact[ti];
 err = Abs[actual - wi];

 output = Append[output, {i, N[ti], N[wi], N[actual], N[err]}];

 If[i == n, Break[]];

 K1 = f[ti, wi];
 K2 = f[ti + h / 2, wi + K1 / 2];

 wi = wi + h * K2;
 ti = ti + h;
]

Print[
 TableForm[
  output,
  TableHeadings → {
   None,
   {"i", "ti", "wi (approx)", "exact", "error"}
  }
 ]
];
```

i	ti	wi (approx)	exact	error
0	1.	1.	1.	0.
1	2.	3.33333	3.38629	0.052961
2	3.	6.2	6.29584	0.0958369
3	4.	9.40952	9.54518	0.135654
4	5.	12.873	13.0472	0.174174
5	6.	16.5385	16.7506	0.212029